CLAIMS

What is claimed is:

1. An immunomodulatory polynucleotide/microcarrier (IMP/MC) complex, comprising:

a polynucleotide comprising an immunostimulatory sequence (ISS) linked to a nonbiodegradable microcarrier (MC), wherein the ISS comprises the sequence 5'-C, G-3', with the proviso that if the MC is gold, latex or magnetic, the linkage is other than by biotin/avidin.

2. The IMP/MC complex of claim 1, wherein said polynucleotide is covalently linked to said microcarrier.

3. The IMP/MC complex of claim 1, wherein said polynucleotide is non-covalently linked to said microcarrier.

4. The IMP/MC complex of claim 1, wherein said microcarrier is a liquid phase microcarrier.

5. The IMP/MC complex of claim 1, wherein said microcarrier is a solid phase microcarrier.

6. The IMP/MC complex of claim 1, wherein said microcarrier is from 10 nm to 10 μm in size.

7. The IMP/MC complex of claim 6, wherein said microcarrier is from 25 nm to 5 μm in size.

8. The IMP/MC complex of claim 1, wherein said complex is antigen-free.

9. The IMP/MC complex of claim 1, wherein the ISS comprises the sequence 5'-T, C, G-3'.

10. The IMP/MC complex of claim 1, wherein the ISS comprises the sequence 5'-purine, purine, C, G, pyrimidine, pyrimidine, C, G-3'.

11. The IMP/MC complex of claim 1, wherein the ISS comprises the sequence SEQ ID NO:1.

12. A method of modulating an immune response in an individual comprising administering to an individual an immunomodulatory polynucleotide/microcarrier (IMP/MC) complex in an amount sufficient to modulate an immune response in said individual, wherein said MC is a nonbiodegradable MC and wherein the ISS comprises the sequence 5'-C, G-3'.

13. The method of claim 12, wherein said microcarrier is a solid phase microcarrier.

14. The method of claim 12, wherein said microcarrier is a liquid phase microcarrier.

15. The method of claim 12, wherein the IMP/MC complex is covalently linked.

16. The method of claim 12, wherein the IMP/MC complex is non-covalently linked.

17. The method of claim 12, wherein said microcarrier is less than about 10 μm in size.

18. The method of claim 12, wherein said complex is antigen-free.

19. The method of claim 12, wherein a Th1-type immune response is stimulated.

20. The method of claim 12, wherein a Th2-type immune response is suppressed.

21. The method of claim 12, wherein the ISS comprises the sequence 5'-T, C, G-3'.

22. The method of claim 12, wherein the ISS comprises the sequence 5'-purine, purine, C, G, pyrimidine, pyrimidine, C, G-3'.

23. The method of claim 12, wherein the ISS comprises the sequence SEQ ID NO:1.

24. A method of increasing interferon-gamma (IFN-γ) in an individual, comprising:

administering an effective amount of an immunomodulatory polynucleotide/microcarrier (IMP/MC) complex to said individual, wherein said MC is a nonbiodegradable MC, wherein the ISS comprises the sequence 5'-C, G-3' and wherein an effective amount is an amount sufficient to increase IFN-γ in said individual.

25. The method of claim 24, wherein said individual has idiopathic pulmonary fibrosis.

26. The method of claim 24, wherein said microcarrier is a solid phase microcarrier.

27. The method of claim 24, wherein said microcarrier is a liquid phase microcarrier.

28. The method of claim 24, wherein the IMP/MC complex is covalently linked.

29. The method of claim 24, wherein the IMP/MC complex is non-covalently linked.

30. The method of claim 24, wherein said microcarrier is less than about 10 μm in size.

31. The method of claim 24, wherein said complex is antigen-free.

32. The method of claim 24, wherein the ISS comprises the sequence 5'-T, C, G-3'.

33. The method of claim 24, wherein the ISS comprises the sequence 5'-purine, purine, C, G, pyrimidine, pyrimidine, C, G-3'.

34. The method of claim 24, wherein the ISS comprises the sequence SEQ ID NO:1.

35. A method of increasing interferon-alpha (IFN-α) in an individual, comprising:

administering an effective amount of an immunomodulatory polynucleotide/microcarrier (IMP/MC) complex to said individual, wherein said MC

is a nonbiodegradable MC, wherein the ISS comprises the sequence 5'-C, G-3' and wherein an effective amount is an amount sufficient to increase IFN-α in said individual.

36. The method of claim 35, wherein said individual has a viral infection.

37. The method of claim 35, wherein said microcarrier is a solid phase microcarrier.

38. The method of claim 35, wherein said microcarrier is a liquid phase microcarrier.

39. The method of claim 35, wherein the IMP/MC complex is covalently linked.

40. The method of claim 35, wherein the IMP/MC complex is non-covalently linked.

41. The method of claim 35, wherein said microcarrier is less than about 10 μm in size.

42. The method of claim 35, wherein said complex is antigen-free.

43. The method of claim 35, wherein the ISS comprises the sequence 5'-T, C, G-3'.

44. The method of claim 35, wherein the ISS comprises the sequence 5'-purine, purine, C, G, pyrimidine, pyrimidine, C, G-3'.

45. The method of claim 35, wherein the ISS comprises the sequence SEQ ID NO:1.

46. A method of reducing levels of IgE in an individual, comprising:

administering an effective amount of an immunomodulatory polynucleotide/microcarrier (IMP/MC) complex to an individual, wherein said MC is a nonbiodegradable MC, wherein the ISS comprises the sequence 5'-C, G-3' and wherein an effective amount is an amount sufficient to reduce levels of IgE in said individual.

47. The method of claim 46, wherein said microcarrier is a solid phase microcarrier.

48. The method of claim 46, wherein said microcarrier is a liquid phase microcarrier.

49. The method of claim 46, wherein the IMP/MC complex is covalently linked.

50. The method of claim 46, wherein the IMP/MC complex is non-covalently linked.

51. The method of claim 46, wherein said microcarrier is less than about 10 μm in size.

52. The method of claim 46, wherein said complex is antigen-free.

53. The method of claim 46, wherein the ISS comprises the sequence 5'-T, C, G-3'.

54. The method of claim 46, wherein the ISS comprises the sequence 5'-purine, purine, C, G, pyrimidine, pyrimidine, C, G-3'.

55. The method of claim 46, wherein the ISS comprises the sequence SEQ ID NO:1.

56. A kit, comprising:

a container comprising an immunomodulatory polynucleotide/microcarrier (IMP/MC) complex, wherein said MC is a nonbiodegradable MC and wherein the ISS comprises the sequence 5'-C, G-3'; and

instructions for use of IMP/MC complex in immunodulation of an individual.

57. The kit of claim 56, wherein said polynucleotide is covalently linked to said microcarrier.

58. The kit of claim 56, wherein said polynucleotide is non-covalently linked to said microcarrier.

59. The kit of claim 56, wherein said microcarrier is a liquid phase microcarrier.

60. The kit of claim 56, wherein said microcarrier is a solid phase microcarrier.

61. The kit of claim 56, wherein said microcarrier is from 10 nm to 10 μm in size.

62. The kit of claim 61, wherein said microcarrier is from 25 nm to 5 μm in size.

63. The kit of claim 56, wherein said complex is antigen-free.

64. The kit of claim 56, wherein the ISS comprises the sequence 5'-T, C, G-3'.

65. The kit of claim 56, wherein the ISS comprises the sequence 5'-purine, purine, C, G, pyrimidine, pyrimidine, C, G-3'.

66. The kit of claim 56, wherein the ISS comprises the sequence SEQ ID NO:1.